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Claims

1. A permanent-magnet motor comprising:

a stator having stator winding of plural phases; and

a rotor facing to inside of the stator across a gap part, and having a rotor core and a permanent magnet provided to the rotor core,

wherein the permanent magnet is made so as to have both of a convex part to an inner diameter side and a convex part to an outer diameter side in a cross section taken vertically to an axis; and

wherein a focus of magnetic orientation of each magnetic pole of the permanent magnet is located outside of the rotor.

2. The permanent-magnet motor of claim 1, wherein the rotor is formed by a rotor core assembly made by multilayering multiple pieces of core laminations, each having plural containing holes for inserting the permanent magnets and the permanent magnets are inserted into the containing holes for inserting the permanent magnets; and

wherein a thickness of the rotor core, which separates the permanent magnet and the gap, is made within $\pm 30\%$ of a thickness of the rotor core lamination.

- 3. The permanent-magnet motor of claim 1, wherein the rotor is formed by including the permanent magnets in an outer peripheral part of the rotor core and a non-magnetic protect pipe is attached around the permanent magnets.
- 4. The permanent-magnet motor of claim 1, wherein a containing hole is provided to the rotor core for inserting the permanent magnet; and

wherein when a radius of an arc of an outer diameter side of the

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containing hole is R, and a radius of an arc of an outer diameter side of the permanent magnet insetted into the containing hole is r, it is set as R<r.

- The permanent-magnet motor of claim 1, wherein the stator is a 5. concentrated winding stator made by directly winding a coil around a teeth part of the stator.
- The permanent-magnet motor of claim 1, wherein a radius of the 6. convex part to the inner diameter side of the permanent magnet is smaller than a radius of the convex part to the outer diameter side of the permanent magnet.
- The permanent-magnet motor of claim 1, wherein a straight line part 7. is provided to each of a part of an arc of an inner diameter side of the containing hole for inserting the permanent magnet and a part of an arc of an inner diameter side of the permanent magnet.
- A permanent-magnet motor comprising: 8.

a stator having stator winding of plural phases; and

a rotor facing to inside of the stator across a gap part, and having a rotor core and a permanent magnet provided to the rotor core, and

wherein the permanent magnet is made so as to have both of a convex part to an inner diameter side and a convex part to an outer diameter side in a cross section taken vertically to an axis.

- A method for manufacturing a permanent-magnet motor including a 9. stator having stator winding of plural phases and a rotor facing to inside of the stator across a gap part, and having a rotor core and a permanent magnet provided to the rotor core, the method comprising:
- making the permanent magnet so as to have both a convex part to an

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inner diameter side and a convex part to an outer diameter side in a cross section taken vertically to an axis.

10. The method for manufacturing the permanent-magnet motor of claim 9, the method comprising:

forming a rotor core assembly by multilayering multiple rotor core laminations, each having plural containing holes for inserting the permanent magnets;

inserting the permanent magnets into the plural containing holes for inserting the permanent magnets; and

wherein a thickness of the rotor core, which separates the permanent magnet and the gap part, is made within $\pm 30\%$ of a thickness of the multiple rotor core laminations.

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